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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.

EXAMINER	
ART UNIT	PAPER NUMBER

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Application No.	Applicant(s)
09/487,259	SHIGEYUKI SASAKI
Examiner	**Art Unit**
Anh D Mai	2814

Office Action Summary

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133)
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 January 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 8-19* is/are rejected.

7)☒ Claim(s) *6 and 7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 January 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3*.
4) ☐ Interview Summary (PTO-413) Paper No(s)
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *Examiner Reason for Allowance*.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Drawings

3. Figures 11-17 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).

Claim Objections

4. Claim 9 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

The limitation of claim 9 is fully covered by claim 1.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 13-19 are rejected under 35 U.S.C. 101 because the claims are directed to neither a "process" nor a "machine" (is held by a protective layer holding means) but rather embraces or overlaps two different statutory classes of invention set forth in 35 U.S.C. 101 which is drafted so as to set forth the statutory classes of invention in the alternative only. *Id.* at 1551. (See MPEP 2173.05(p)(b)).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 13-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A single claim which claims both an apparatus and the method steps of using the apparatus is indefinite under 35 U.S.C. 112, second paragraph. In *Ex parte Lyell*, 17 USPQ2d 1548 (Bd. Pat. App. & Inter. 1990).

Further, the limitation of claim 15 includes: wherein the protective holding means is placed on the *same face* on which the semiconductor wafer with the protective layer is fixed.

How can two layers be placed to a same face?

Insofar as understood by examiner, the protective holding means and the protective layer is on the same side of the semiconductor wafer as shown in Fig. 10c.

7. Claim 19 recites the limitation "grooves extending in a radial manner from the center of the semiconductor wafer" in line 3-4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 3-5, 9, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mutsumi et al. (JP 63-117445A).

Mutsumi teaches a manufacturing method for a semiconductor device as claimed including the steps of:

semi-full dicing a semiconductor wafer (1) so as to leave a dicing residual portion with a predetermined thickness between devices on the semiconductor wafer;

forming a protective layer (3) having a chemical etching resistant property on an element formation face of the semiconductor wafer;

chemically etching the semiconductor wafer having the protective layer formed on the element formation face from the rear face side so as to polish the rear face of the semiconductor wafer, so as to remove the dicing residual portion to divide the semiconductor wafer into individual semiconductor chips, and so as to remove damaged areas in a cut face of the semiconductor wafer resulted from the semi-full dicing process. (See Figs. 2a-f).

With respect to the limitation: "*so as* to remove damaged areas in a cut face of the semiconductor wafer resulted from the semi-full dicing process". Mutsumi also chemically etches the semiconductor wafer (1) having the protective layer, thus the etching also remove the damaged areas. Furthermore, it appears that the protective layer (3) is only applied to the top surface of the semiconductor wafer (1). Therefore, the removal step of the process of Mutsumi '445 which includes removing the back side of the wafer more than the residual (6), also results in a removal of the damaged areas caused by the semi-full dicing. (See translation page 5).

With respect to claim 3, the process of Mutsumi further includes: removing the protective layer (3) from the semiconductor chips that have been individually divided, after the chemical etching process.

With respect to claim 4, the semi-full dicing process of Mutsumi includes: subjecting the semiconductor wafer to semi-full dicing from the element formation face so as to leave a dicing residual portion (6) with a predetermined thickness on the side of the rear face that is opposite to the element formation face of the semiconductor wafer.

With respect to claim 5, the protective layer (3) of Mutsumi is formed on the element formation face of the semiconductor wafer after the semi-full dicing process and having a chemical etching resistant property.

With respect to claim 9, the protective layer (3) is a film having a chemical resistant property.

With respect to claim 13, the protective layer (3) of Mutsumi is held by a protective layer holding means (7) with a uniform tension.

With respect to claim 14, the protective layer holding means (7) of Mutsumi is placed on the opposite face on which the semiconductor wafer (1) with the protective layer (3) is fixed.

9. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mutsumi '445 as applied to claim 1 above, and further in view of applicant admitted prior art.

Mutsumi teaches all of the features of the claim with the exception of explicitly disclosing a testing step prior to form the semi-full dicing.

However, the admitted prior art disclosing that testing to identify the working and non-working dices are routinely performed prior to the dicing the wafer into individual chips.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to perform testing prior to semi-full dicing the semiconductor wafer (1) of Mutsumi as taught by the admitted prior art to identify the bad chips prior to dicing.

10. Claims 8 and 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mutsumi '445 as applied to claims 1 and 13 above, and further in view of Kazuya (JP 07-022358).

With respect to claim 8, Mutsumi teaches all of the features of the claim with the exception of polishing the rear surface of the semiconductor wafer (1) prior to forming the semi-full dicing.

However, Kazuya teaches polishing the back side of the semiconductor wafer (1) to remove a portion of the semiconductor wafer prior to forming the semi-full dicing. (See Figs. 5-6 and 9-10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to polish the back side of the semiconductor wafer (1) of Mutsumi '445 prior to forming the semi-full dicing as taught by Kazuya '358 because polishing will remove the bulk of the wafer thus, the overall process time is minimized. Further, the chemical etching process of Mutsumi '445 can also remove the damage caused by the polishing as well.

With respect to claim 10, the protective layer of Kazuya is a chemical etching resistant film having an ultraviolet separation property, which the adhesive strength is reduced upon irradiated with ultraviolet rays.

With respect to claim 11, Mutsumi '445 and Kazuya '358 teach all of the features of the claim with the exception of using chemical etching resistance protective film having a characteristic of reduction adhesive strength upon application of heat. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to use chemical etching resistance film of a thermal foaming type for the protective layer, since it has been held to be within the general skill of worker in the art to select a known material on the basis of it suitability for the intended use as a mater of obvious design choice. *In re Leshin, 125 USPQ 416.*

With respect to claim 12, the protective layer of Kazuya '358 comprises a chemical etching resistance film of sticking type, which has an adhesive strength as claimed.

With respect to claim 13, the protective layer (4) of Kazuya '358 is held by a protective layer holding means (5) with an uniform tension.

With respect to claim 15, the protective layer holding means (5) of Kazuya '358 is placed on the same face on which the semiconductor wafer (3) with the protective layer (4) is fixed.

With respect to claim 16, the protective layer (4) of Kazuya '358 has a peripheral portion on which a protective layer holding means having a chemical etching resistance property is placed in a manner so as to surround the entire circumference (5) of the semiconductor wafer (3).

With respect to claim 17, the protective layer holding means (5) of Kazuya '358 has a ring shape with a flat bonding face for the protective layer (4).

With respect to claim 18, Mutsumi and Kazuya '358 teach all of the features of the claim with the exception of explicitly disclosing a draining means.

However, the dicing apparatus is known to includes dicing wheel and cooling means to cool the wheel and removing the dust created during the cut. Water or liquid are known cooling medium. Therefore, standing liquid in the dicing apparatus must be eliminate to prevent contamination. Thus, draining means is inherent of the apparatus.

With respect to claim 19, as best understood by examiner, the radial shape of the draining means does not a appears to be critical since it is only to be used to drain the liquid.

11. Claims 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mutsumi '445 as applied to claim 1 above, and further in view of Usami et al. (U.S. Patent No. 5,893,746).

With respect to claims 10 and 11, Mutsumi teaches all of the features of the claim with the exception of including element which reduces the adhesive strength upon exposing to UV or heat.

However, Usami teaches using protective layer comprising elements which reduce adhesive strength upon exposing to UV or heat.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to form the protective layer (3) of Mutsumi using the elements as taught by Usami for easy removal of the diced chips.

With respect to claim 12, the protective layer of Usami comprises sticking type, which has an adhesive strength similar as claimed.

With respect to claim 13, the protective layer (4) of Usami is held by a protective layer holding means (101) with an uniform tension.

With respect to claim 14, the protective layer holding means (101') of Usami is placed on the opposite face on which the semiconductor wafer (105) with the protective layer (107') is fixed.

With respect to claim 15, the protective layer holding means (101) of Usami is placed on the same face on which the semiconductor wafer (105) with the protective layer (107) is fixed.

With respect to claim 16, the protective layer (107) of Usami has a peripheral portion on which a protective layer holding means (101) having a chemical etching resistance property is placed in a manner so as to surround the entire circumference of the semiconductor wafer (105).

With respect to claim 17, the protective layer holding means (101) of Usami has a ring shape with a flat bonding face for the protective layer (107).

With respect to claim 18, Mutsumi and Usami teach all of the features of the claim with the exception of explicitly disclosing a draining means for draining the etchant.

However, it appears that no etchant is standing during and after the etching process. (See Figs. 5-6).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to include a draining means in the apparatus of Usami to prevent etchant from attacking the sides of the semiconductor wafer (105). Further, draining means is inherent of the apparatus.

With respect to claim 19, as best understood by examiner, it appears that the etching apparatus of Usami is rotated in circular direction, therefore, the manner in which the grooves are formed will not affect the drainage of the etchant.

Allowable Subject Matter

12. Claims 6 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is an examiner's statement of reasons for allowance: prior art of record fails to teach a method for manufacturing of a semiconductor device including: forming the semi-full dicing on the rear face (back-side) of the semiconductor wafer, leaving a dicing residual with a predetermined thickness on the device side.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (703) 305-0575. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A.M
July 17, 2001

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